June 2, 1925. 1,540,722

C. C. COLBERT ET AL

HANG-UP APPARATUS

Filed Oct. 6, 1923 2 Sheets-Sheet 1

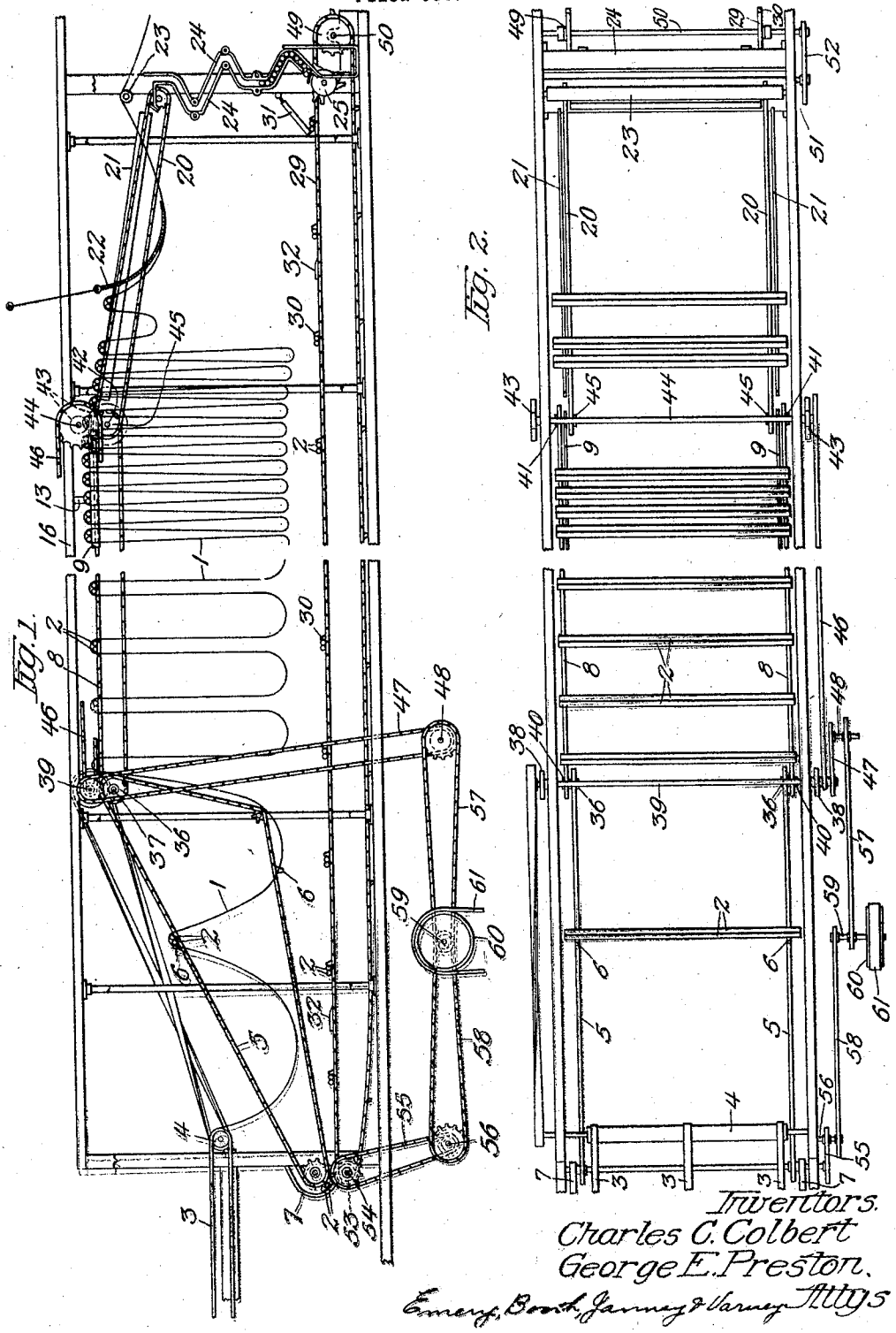


Fig. 1.



Fig. 2.

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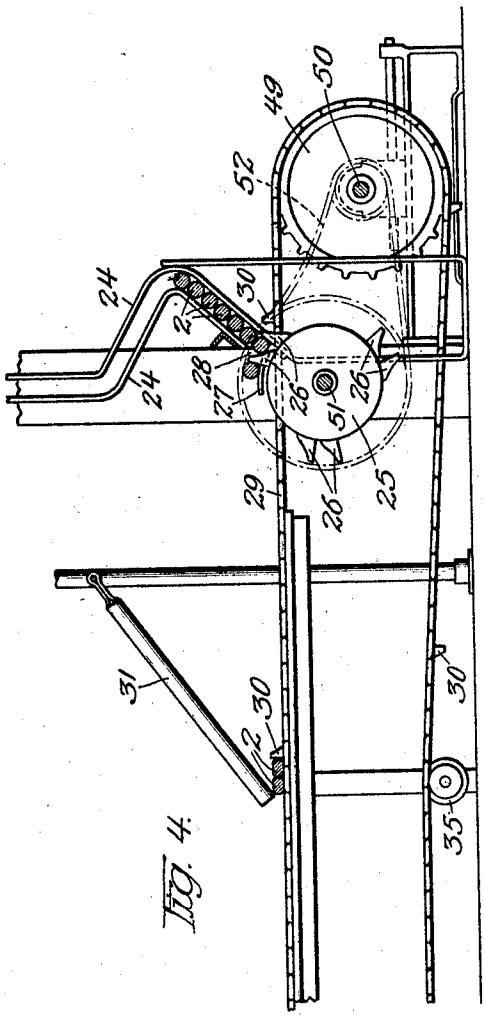



Fig. 4.

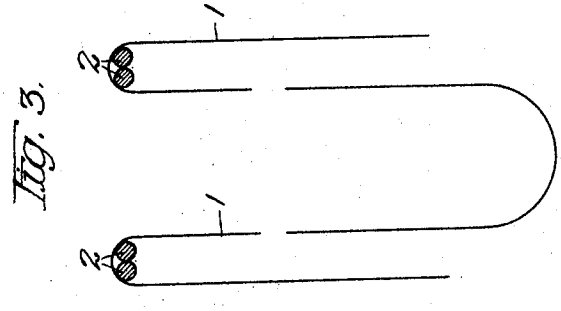



Fig. 3.

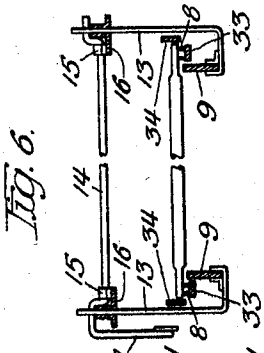



Fig. 6.

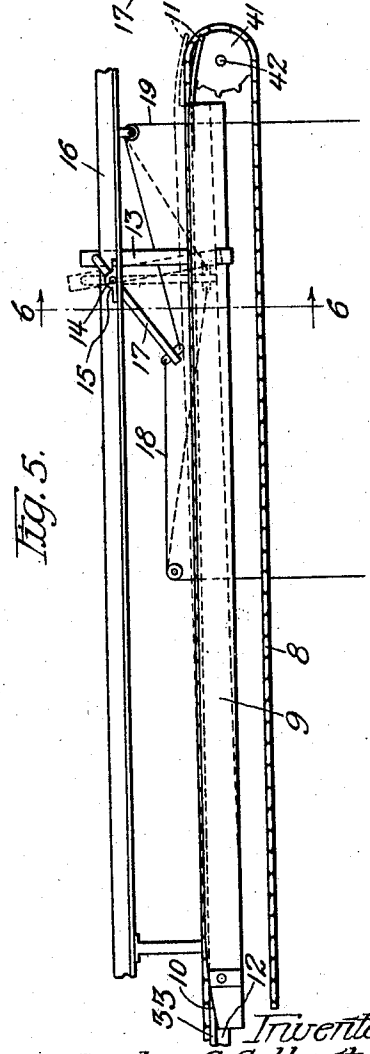



Fig. 5.

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Patented June 2, 1925. 1,540,722

# UNITED STATES PATENT OFFICE.

CHARLES C. COLBERT AND GEORGE E. PRESTON, OF ELKHART, INDIANA, ASSIGNORS TO AMERICAN COATING MILLS, OF ELKHART, INDIANA, A CORPORATION OF INDIANA.

## HANG-UP APPARATUS.

Application filed October 6, 1923. Serial No. 666,900.

*To all whom it may concern:*

Be it known that we, CHARLES C. COLBERT and GEORGE E. PRESTON, citizens of the United States, and residents of Elkhart, in the county of Elkhart and State of Indiana, have invented an Improvement in Hang-Up Apparatus, of which the following is a specification.

This invention relates to the class of apparatus employed for hanging up sheet material, such for instance as paper board, coated paper or the like, during storage, seasoning, drying or other treatment.

Among other objects the invention is intended to provide a practicable and convenient hang-up apparatus in which comparatively stiff material may be suspended without undue bending at the points of suspension.

The invention will be clearly understood by reference to one illustrative apparatus embodying the invention, which is shown in the annexed drawings.

In said drawings:

Fig. 1 is a side view of the illustrative apparatus.

Fig. 2 is a plan view thereof.

Fig. 3 is a detail view representing successive folds of material each supported by groups or pairs of sticks.

Fig. 4 is a detail view showing the ejector wheel drive and a portion of the return conveyor of the sticks adapted for circulating two sticks at a time.

Fig. 5 is a detail view of a dead rack rail embodied in the apparatus, with dotted lines indicating the elevated position of the rail.

Fig. 6 is a cross-section on the line 6—6 of Fig. 5.

The illustrative apparatus, in which continuous material 1 hangs in festoons or folds, comprises means including a supply of sticks 2 for carrying said material on transverse supports provided by pluralities or groups of said sticks. In this instance, the individual supports from which the material hangs are provided by sticks assembled in pairs. The sticks preferably consist of round wooden poles or the like, the ends of which may be flattened to enable them to rest upon appropriate supporting or carrying means without tendency to roll or turn thereon. By utilizing such sticks in pairs or pluralities for the purpose stated, comparatively thick or stiff material such for instance as heavy paper board may be suspended in the apparatus without sharp bending over its supports.

For collecting a desired supply of hanging festoons of material while the material is being introduced into the receiving end of the apparatus and withdrawn from its delivery end, the sticks are caused to travel in a circuitous course; and to permit variation in the number of sticks in operative use, accompanying variation in the accumulation of hanging festoons of material in the apparatus, a reserve supply of said sticks is interposed in said course. The sticks are discharged into said reserve supply after withdrawal of the material from the sticks, and are returned into circulation in pairs or groups for hanging up and conveying the material. The specific means employed in the illustrative machine for these purposes will presently be described.

The material 1 may be continuously supplied from a producing or treating machine, and may be delivered to the hang-up apparatus by a conveyor 3 or over a roller or other means at an appropriate elevation for the in-feeding of the material.

For hanging up the material, as it is delivered to the apparatus, the pairs of sticks 2 are successively brought under the material at appropriate intervals of time to allow desired lengths of the material to sag between the successively presented pairs and between the conveyor roller 4 and the pair of sticks being carried into use, as shown in Fig. 1.

This is performed in the illustrative apparatus by endless elevating chains 5, running at an upward inclination, and having appropriately spaced lugs 6 for supporting the pairs of sticks. The elevating chains take up the sticks from holders 7 to which the sticks are successively introduced in groups or pairs by means hereinafter described. These holders 7 are shown as semi-circular guideways coaxial with the lower sprocket wheels of the elevating chains.

The elevating chains 5 deliver the pairs of sticks to a conveying means represented by parallel endless chains 8, appropriately

spaced for supporting the ends of the sticks while allowing the festoons of material to hang between the chains.

The parallel chains 8 are adapted to carry the pairs of sticks longitudinally of the apparatus and, if desired, may have a considerably slower rate of movement than the elevating chains, so as to cause the pairs of sticks to be deposited upon the chains 8 at closer intervals and consequently to hang the material in closer folds.

The chains 8 typify conveying means of any desired length and character along which the material accumulates in hanging festoons or folds. Said conveying means may if desired comprise successive pairs of carrier chains, running at the same or different speeds for varying the widths of the festoons, and may be associated with any appropriate means for exposing the material conveyed to the action of a heating medium or other treating means during its transportation through the hang-up apparatus.

From the accumulated supply of slack material hanging in the hang-up apparatus, the material may be continuously withdrawn either for subsequent treatment in the course of its manufacture or for reeling in the case of finished material. It may be desirable to vary the amount of accumulation in the hang-up apparatus for the purpose of controlling a period of seasoning, drying or other treatment of the hanging material, or for accommodating the accumulation to conditions arising in the operation of a plant in which the apparatus is included.

For example, where the illustrative apparatus is arranged between a machine for producing raw paper, paper board or the like and a subsequent machine for coloring or otherwise treating the material, it is desirable in event of temporary interruption of such subsequent machine to permit continuous operation of the producing machine with continuing delivery to and accumulation of the material in the hang-up apparatus, without necessitating continued withdrawal of the material therefrom. On the other hand, where the hang-up apparatus receives material from a preceding treating machine and delivers to a finishing machine, it is desirable in event of temporary interruption of operation of said treating machine to have an ample reserve supply of material in the hang-up apparatus from which the finishing machine may continue to draw its supply.

The illustrative hang-up apparatus embodies provision for variation of accumulating capacity in several ways. In event of any interruption or slowing of operation in a succeeding machine or unit of the plant, thereby interrupting or slowing the withdrawal of material from the delivery end of the apparatus, the hanging folds of material can crowd together in said delivery end as represented in Fig. 1, and as will be explained more fully hereinafter. Considerable variation of accumulation may also be obtained by a speed adjustment hereinafter described. In addition to these provisions, a large reserve supply of the hanging material may be stored at will in the hang-up apparatus by the means now to be described.

Associated with the carrier chains 8 is a dead rack comprising longitudinal rails or bars 9, one beside each of the parallel chains (Figs. 1, 2, 5 and 6). These dead rack bars 9 are supported so as to permit them to be depressed below the levels of the carrying runs of the chains, in the position shown in Fig. 5, which is their normal position, or to be elevated above the chains in the position indicated by dotted lines in Fig. 5. The rear ends of said bars are bevelled or inclined as indicated at 10 so that, when the bars are in the elevated position indicated by dotted lines in Fig. 5, the pairs of sticks 2 carrying the festoons of material may ride onto the dead rack bars, after which the pairs will be pushed along said bars one by the other, as represented in Fig. 1. Thus a large number of festoons or hanging folds of material may be accumulated closely on the dead rack. The delivery ends of the dead rack bars are shown provided with curved extensions 11 which in the elevated position of the bars will overlie the sprocket wheels at the delivery ends of the carrier chains and permit the sticks to be discharged from the delivery end of the dead rack.

In the specific construction shown in the drawings, the dead rack bars 9 are pivoted at their receiving ends to suitable supports, indicated at 12 (Fig. 5), while their delivery end portions are carried by hangers 13 suspended from cranked portions of a crank shaft 14 journalled in bearings 15 in the upper framework 16 of the hang-up apparatus (Figs. 5 and 6). One of the cranked portions of the crank shaft 14 is provided with an operating lever 17 which may be operated in one direction or the other by pull cords 18 and 19. By this means the cranked portions of the crank shaft may be moved to a position of dead centers with respect to the bearings of the crank shaft, thus supporting the dead rack bars 9 in elevated position, and the parts may be maintained in this position by maintaining the pull cords 18 and 19 taut and fastening them at any convenient place.

One or more additional reserve racks of the character described may if desired be provided in advance of that shown, so as further to increase the storage capacity of the hang-up apparatus if required. For in-

stance, if the withdrawal of the material from the hang-up apparatus should be suspended for a longer period than that required to fill the dead rack shown in the drawings, a preceding similar rack may be brought into play, so that the successively advancing pairs of sticks carrying the festoons of material will ride onto said preceding rack and collect in close relation before being redelivered to the conveyor chains.

At the delivery end of the illustrative hang-up apparatus (Figs. 1 and 2), means are provided to facilitate withdrawal of the material from the accumulated supply hung up in said apparatus. For this purpose the carrier chains 8 deliver the groups or pairs of sticks carrying the suspended folds of material upon declined delivery chains 20, from which the sticks are delivered to declined rails 21 arranged beside said chains and gradually rising to an elevation above the chains to permit the groups of sticks to ride from the chains onto said rails. The suspended material is withdrawn from the pairs of sticks resting on said rails, while the sticks slide down the rails and are discharged.

If the dead rack bars 9 are depressed, as shown in Fig. 5, the pairs of sticks 2 will ride from the chains 8 onto the chains 20 and thence onto the rails 21, and the sticks will be caused to slide down the rails under the drag of the hanging material as it is withdrawn by a succeeding treating, finishing, reeling or other machine. If the withdrawal of the material should be interrupted by temporary interruption in the operation of a succeeding unit of the plant, the groups of sticks with the hanging folds of material may crowd together and accumulate on the declined rails 21 as shown in Fig. 1. If the interruption of withdrawal is for a longer period than that which can be accommodated by the accumulating capacity of said rails, while the material is being continuously supplied to and hung up in the apparatus, the dead rack bars 9 should be elevated, as already explained, allowing the successively advancing pairs of sticks carrying the festoons of material to collect in crowded assembly on said bars, as shown in Fig. 1.

Upon resumption of operation in the succeeding unit of the plant, with accompanying resumption of the withdrawal of the material from the hang-up apparatus, the dead rack bars may be depressed to allow the sticks to rest again upon the conveying chains 8, which will deliver the crowded pairs of sticks onto the chains 20 and thence onto the rails 21; and the operation of said succeeding unit may be temporarily speeded up to effect a more rapid withdrawal of the material until the excess accumulation is drawn off and normal conditions restored.

The rails 21 retard the travel of the sticks, and offer a desirable frictional resistance to the movement of the sticks as the sagging material is withdrawn therefrom. Furthermore, under various conditions, these rails permit the groups of sticks to accumulate one or more behind another during and until the withdrawal of the board from folds suspended between successive groups, thus avoiding continued travel of the sticks during the withdrawal.

The pull of the material as it is withdrawn from the hang-up apparatus drags the groups of sticks down the inclined rails and causes them to slide down the rails and to be discharged. There may frequently be a number of groups of sticks in close relation on the rails. To prevent the pull of the material from dragging the sticks and crowded festoons of material too rapidly down the rails, and to prevent jerking of the material from the successive folds, there is provided a suspended or swinging wiper 22 (Fig. 1), such for instance as a sheet of carpet or other suitable flexible material, which rests upon and drags against the material and exerts a retarding action on the sticks. Thus the material is withdrawn against the resistance of the swinging wiper 22 and of the sticks in frictional contact with the declined rails 21, contributing to smooth and even withdrawal.

The material may be withdrawn from the hang-up apparatus over a guide roller 23, while the sticks 2 slide down the rails 21 onto the delivery ends of the chains 20 and are deposited into a magazine comprising parallel guides 24 which are zig-zag shaped to break the fall of the sticks (Figs. 1 and 4). The sticks pile one upon another in the magazine, in which a reserve supply of the sticks is maintained, and the sticks are successively ejected from the lower end of the magazine by rotating wheels 25 having ejecting lugs 26 shown arranged in pairs for ejecting the sticks one immediately after another to effect their ejection in pairs. To permit ejection, the lower ends of the magazine guides 24 are shown constructed with feet 27 to support the sticks and with ejecting openings 28 (Fig. 4).

The ejected pairs or groups of sticks are carried by a return conveyor 29 back to the receiving end of the hang-up equipment. Said return conveyor is shown as a pair of parallel chains provided at suitable intervals with lugs 30 for engaging and forwarding the sticks. As the pairs of sticks are successively ejected from the magazine, swinging bumpers 31 knock against the sticks to steady them and prevent them from being thrown too far. As a means for straightening or aligning the pairs of sticks crosswise on the return conveyor, inclined obstructors 32 are arranged in the path of

the sticks, over which the sticks must ride, thus insuring their lodgment against the lugs 30 of the return conveyor chains and their delivery to the receiving end of the hang-up apparatus in proper transverse alignment.

At the receiving end of the hang-up equipment, the return conveyor 29 delivers the pairs of sticks into the curved guideways 7, associated with the lower sprocket wheels of the elevating chains 5, and the lugs 6 of the elevating chains pick up the pairs of sticks and carry them successively under or into position for hanging up the in-feeding material as before explained.

Thus the sticks are circulated back and forth through the hang-up apparatus in groups or pairs, and a reserve supply of sticks is maintained in the magazine 24, to permit variation in the number of sticks employed at a given time according to conditions existing as to capacity of accumulation of the material, as determined by speed adjustment, by adjustment of the reserve rack bars 9 or other conditions.

It will be understood that the organization of the illustrative apparatus is such that the desired groups of sticks, in this instance groups of two, are ejected from the magazine guides 24 at suitable intervals of time to be successively engaged and forwarded by the successive lugs 30 of the return conveyor 29, and are thereby delivered one group after another into the curved guide 7 at proper periods to be engaged and picked up by the successively advancing lugs 6 of the elevating chains 5.

Such utilization of pairs or groups of sticks as individual supports is especially advantageous in hanging up certain kinds of material such as very heavy or stiff board when it is desired to relieve the bending of the board.

The several endless chains constituting the stick conveying system of the apparatus may have their upper runs supported on suitable rails 33 as indicated in Figs. 5 and 6, for the upper run of the chain 8, and may be associated with side rails 34 for guiding the ends of the sticks and for preventing the sticks from shifting lengthwise, i. e., transversely of the hang-up apparatus. Idle sprockets or guide wheels 35 for guiding the lower runs of the chains may be provided as required.

The means shown in the drawings for driving the conveying system of the illustrative hang-up apparatus is as follows:

The elevating chains 5 are trained at their upper ends around driving sprockets 36 affixed on stub shafts 37, driven by gearing 38 from an overhead shaft 39 (Figs. 1 and 2). On the same stub shafts 37 are loose sprocket wheels 40 around which are trained the receiving ends of the longitudinally running carrier chains 8. Said chains 8 are trained at their delivery ends around driving sprockets 41 affixed on stub shafts 42 driven by gearing 43 from an overhead shaft 44 (Figs. 1 and 2). On the same stub shafts 42 are affixed driving sprockets 45 for the declined delivery chains 20. Should the longitudinal conveying means comprise more than a single pair of chains, for instance, successive pairs of chains, as may be desired in a lengthy conveying system, each pair of such chains may be trained at their delivery ends around driving sprockets, coaxial with driven sprockets for the receiving ends of the next pair of chains, such driving and driven sprockets being mounted fast and loose on stub shafts driven by gearing from an overhead shaft, in the same manner as explained in reference to the chains 5 and chains 8, the delivery and receiving ends of which are respectively trained around the coaxial fast and loose sprockets 36 and 40 on the stub shafts 37 driven from overhead shaft 39. In the case of conveying means comprising such successive pairs of chains, the several overhead shafts may be driven by transmission chains one from another, and at the same or varying speeds as desired. In the illustrative apparatus, where the longitudinal conveying means comprises the single pair of carrier chains 8, the overhead shaft 44 at the delivery section of the apparatus is driven by an endless chain 46 from the overhead shaft 39 at the receiving section; and said overhead shaft 39 is driven by a chain 47 from a shaft 48 shown located below the floor of the plant (Figs. 1 and 2).

Referring to the return conveyor 29, at its receiving end, i. e., at the delivery end of the hang-up apparatus, the return conveyor chains are trained around driven sprockets 49 on a shaft 50, from which shaft 50 the shaft 51 of the ejecting wheels 25 is driven by a chain 52 (Figs. 2 and 4). By employing a slack driving chain 52, the ejector wheels may be operated with an intermittent jerking action for effectively discharging the sticks, the resistance to ejection due to the weight of the superimposed pile of sticks in the magazine will retard the rotation of the ejector wheels until the chain 52, driven by the comparatively slow running shaft 50, stretches or becomes taut in its lower run, thereby imparting a sudden rotation or jerk to the ejector wheels causing them to eject the sticks and to overrun the chain drive so as to slacken the lower run while the upper run becomes taut to check the rotation of the ejector wheels. As soon as the chain becomes taut in its lower run, the upper run becoming slack, the action is repeated, and so on.

At the delivery end of the return conveyor, i. e., at the receiving end of the hang-